

# MEMOIRS

OF THE

## CARNEGIE MUSEUM.

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FOSSIL AVIAN REMAINS FROM ARMISSAN.

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The history of gallinaeous birds is traceable as far back as the Middle Eocene, the earliest known genus being found in the Green River limestone of Wyoming. This is known by a single, nearly perfect skeleton, and seems to be closely related to the existing *Ortalis*. From the Upper Eocene of the Paris Basin have been described two species of *Palaeortyx*, which comprise small pheasant-like birds, with the rostrum longer and less curved than in modern forms. Certain fragments occurring in the Quercy Phosphorites (Upper Eocene), and the calcareous marl of Vaucluse, supposed to be of equivalent age, are likewise referred to *Palaeortyx*, and several species are also known from the Mioocene of Southern France. The remarkable and highly specialized Hoactzin, or *Opisthocomus*, of South America, whose habits and certain points of structure suggest considerable affinity with the *Cuculi*, is represented by a closely similar genus (*Filholornis*) in the Phosphorites of Quercy.

The fresh-water limestone of Armissan, near Narbonne (Aude), by some geologists regarded as of Upper Eocene, by others as of Oligocene age, has furnished remains of a single genus (*Taoperdix*), which agrees somewhat closely with modern pheasants; and *Phasianus* itself occurs rather abundantly in the Middle and Upper Miocene, and also in the Lower Pliocene of Pikermi, where it is accompanied by *Gallus*. A species of fossil turkey (*Meleagris antiquus*) is known from the White River Oligocene of Colorado, the same genus being also represented in the Pleistocene of New Jersey, Pennsylvania and probably elsewhere in this country. Under the name of *Palaeoperdix*, three species of fossil pheasants have been described from the Middle Miocene of Sansan (Gers). *Gallus* and *Phasianus* appear to be the only known Pliocene genera, but from the Pleistocene and cavern deposits of various

parts of the world a considerable number of gallinaeous birds have been brought to light, the more important of which are enumerated in the following list.

TABLE SHOWING GEOLOGICAL DISTRIBUTION OF GALLINACEOUS BIRDS.

*Middle Eocene.*

*Gallinuloides wyomingensis* Eastman. Green River limestone; Uinta County, Wyoming.

*Upper Eocene.*

*Palæortyx hoffmanni* (Gervais). Gypsum of Paris Basin, Montmartre.

“ *bluncharidi* Milne-Edwards. Gypsum of Paris Basin, Montmartre.

“ sp. indet. Gypsum of Paris Basin, Montmartre.

*Filholornis paruloxa* Milne-Edwards. Querey Phosphorites.

“ *gravis* “ “ “ “

“ *debilis* “ “ “ “

*Taoperdix pessieti* (Gervais). Laeustrine limestone; Armissan (Aude).

“ *keltica* Eastman. “ “ “ “

*Oligocene.*

*Meleagris antiquus* Marsh. White River Beds; Colorado.

*Lower Miocene.*

*Palæortyx cayluxensis* Lydekker. Phosphorites of Caylux (Tarn-et-Garonne).

“ *gallica* Milne-Edwards. Lacustrine deposits of Allier, and Phosphorites of Caylux.

“ *brevipes* Milne-Edwards. Lacustrine deposits of Allier.

“ (?) *phasianooides* “ “ “ “

“ *media* “ “ “ “ (descrip. insuf.).

*Middle Miocene.*

*Palæortyx edwardsi* Depéret. Saint-Alban-de-Roche (Isère).

*Palæoperdix longipes* Milne-Edwards. Sansan (Gers).

“ *prisca* “ “ “

“ (?) *sansaniensis* “ “ “

*Phasianus altus* “ “ “ and Saint-Alban-de-Roche (Isère).

“ *medius* “ Sansan (Gers).

“ *desnoyersi* “ Orleannais.

*Upper Miocene.*

*Phasianus altus* Milne-Edwards. Lacustrine deposits; Ceningen, Switzerland.

*Lower Pliocene.*

*Phasianus archiaci* Gaudry. Pikermi (Attica).  
*Gallus æsculapii* " " "

*Upper Pliocene.*

*Gallus bravardi* Gervais. Ardé, near Issoire (Puy-de-Dôme).

*Pleistocene.*

*Tetrao tetrix* Linn. Kent's Hole Tavern, near Torquay, Devonshire.  
 " *wrogallus* Linn. Forestbed (?) of Norfolk.  
*Lagopus albus* (Gmelin). Cavern deposits near Montauban (Tarn-et-Garonne).  
 " *mutus* (Montin). " " " " "  
*Francolinus pictus* (Jardine and Selby). Cavern deposits; Madras, India.  
*Coturnix novæ-zealandiæ* Quoy and Gaimard. Superficial deposits; New Zealand.  
*Tympanuchus pallidicinctus* Ridgway. " " Oregon.  
*Pediocætes phasianellus* Linn. " " "  
 " *nanus* Shufeldt. " " "  
 " *lucasi* " " " "  
*Polæotetrix gilli* " " " "  
*Meleagris superbus* Cope. " " New Jersey.  
 " *celer* Marsh. " " "  
 " sp. indet. Caves of Pennsylvania.  
*Gallus* sp. Rare in European bone caverns.  
*Perdix* sp. " " " "

It will be seen from the foregoing that although gallinaceous birds are plentiful in the late Tertiary, with the exception of the Pliocene, our knowledge of them in the Eocene is confined to but four genera. Two of these, futhermore, are known by a solitary individual each; and as Eocene bird remains are seldom well preserved, it is clear that the discovery of fairly complete skeletons from this horizon is a matter of considerable interest and importance. The Carnegie Museum is therefore to be congratulated upon having recently acquired two tolerable skeletons of Eocene birds from the lacustrine limestone of Armissan, near Narbonne (Aude), the existence of which has not hitherto been made known.

These specimens form part of the famous Bayet Collection, presented by Mr. Andrew Carnegie to the Pittsburgh Museum in 1903; and through the unfailing courtesy of Dr. W. J. Holland, Director of the Museum, the present writer has been generously entrusted with their description. For this privilege he desires to express here his sincere thanks.

It has not been possible, however, to offer descriptions of both of these specimens in the following pages, owing to the fact that only one of them (fortunately the better preserved of the two) has not been sufficiently disengaged from the matrix to permit of its extended study. The specimen about to be described bears the Carnegie Museum catalogue number 2023, and belongs unquestionably to the genus *Taoperdix*, founded by Milne-Edwards<sup>1</sup> upon a unique individual from Armissan, which had been previously described by Gervais under the name of *Tetrao pessieti*.<sup>2</sup> Although agreeing with the type in its general characters, the Carnegie example differs from it in its greatly reduced length of wing, and in the disproportion of its limb bones; hence it may properly be regarded as constituting a distinct species. It may be fittingly designated as *Taoperdix keltica*, in commemoration of the name bestowed by Aristotle upon the inhabitants of the country near Narbonne.<sup>3</sup>

TAOPERDIX KELTICA, sp. nov. (Plates XIII.—XIV.)

Founded upon the crushed skeleton of a bird having approximately the size of a ruffed grouse (*Bonasa umbellus*), and differing from the type species of *Taoperdix* in the relative proportions of its limb bones, especially its much reduced humerus; also with shorter mandible. Upper Eocene; Armissan.

Although the skeleton is considerably dismembered and confused, both in the type of this species and in that of *T. pessieti*, as may be seen from a comparison of the plates, this circumstance must be regarded as rather fortunate than otherwise, since it permits of a more precise examination of the several parts. It is also fortunate that these two type-specimens should supplement each other in important respects. For our knowledge of the cranium we must depend solely upon the specimen belonging to the Carnegie Museum, although the mandible is present in both. Most of the limb bones, too, are better preserved in the new than in the older known species; but the latter, on the other hand, alone exhibits the furculum, sternum and pelvis in satisfactory manner. In the accompanying restoration of *T. keltica*, parts which are wanting or not clearly recognizable in the actual fossil are represented in outline after analogy with the type species or with recent pheasants, as the case may be. That is to say, when an epiphysis or articular condyle has become crushed or otherwise obliterated in the fossil before us, these parts are restored according to the

<sup>1</sup> Oiseaux Fossiles de la France, Vol. II., p. 225, pl. 127, Paris, 1871.

<sup>2</sup> *Comptes Rendus*, Vol. LIV. (1861), p. 896.

<sup>3</sup> Prior to the Roman conquest of Gaul, the whole of that country bore the name of Keltica; but after its occupation by the Romans the southern provinces were distinguished from the rest of Keltica by conferring upon them the name of *Gallia Narbonensis*. An interesting description of the Narbonnaise is given by Strabo in the fourth book of his *Geography*, and further accounts of this region are to be found in the well-known *History* of Polybius. Both of these ancient writers mention among the wonders of this country the occurrence of so-called "subterranean fish" or "dug mullets," which the inhabitants obtained by digging to a depth of two or three feet in marshy districts.

usual conditions in modern *Phasianidæ*. All of the bones shown in Plates 1 and 2 are precisely as they occur in nature.

Passing now from these general considerations to an account of the several parts of the skeleton, we note that the head is of average size, rather abruptly truncated behind, with a maximum width of 2.2 cm. across the occiput, the orbits being rather posteriorly situated. The mandible is slender, without apparent downward curvature in front, approximately 3 cm. in length. The sternum and pelvis, not clearly indicated in the Carnegie example, but well shown in the type species, are regarded by Lydekker<sup>1</sup> as suggesting affinity with *Numidia* and *Melagris*. It is an open question, however, whether the lateral aspect of the sternum has not become widened through mechanical compression of the matrix; at any rate the published figure creates a suspicion that such has been the case. A small portion only of the sacrum is preserved in the Carnegie specimen, the furcula is wanting, and the coracoids not distinctly recognizable. The last-named elements in *T. pessieti* are stout and straight, without subclavicular process, and with broad sternal facets. In both species the scapula is long and sabre-shaped, without being expanded posteriorly.

Important points of comparison are furnished by the limb bones, which are excellently preserved. It is evident that the species under discussion possessed but feeble powers of flight, the humerus being notably shorter than in *T. pessieti* and most living pheasants. This bone exhibits a slight double lateral curvature, and has a head of moderate size. The remaining wing bones are proportionally abbreviate, the brachium being of about equal length with the humerus. Nearly all of the bones of the manus in both wings are well preserved, and the same is true of the pes. The femur is relatively stout, of medium length, and with a slight forward curvature, the head being concealed. The tibio-tarsus is a stout bone, its length having a ratio of 1.3 as compared with the femur, and 1.7 as compared with the tarso-metatarsus. The latter element is without spurs, so far as indications show, and appears to have been more or less flattened from front to back. The trochleæ are of moderate size and widely separated. The phalangeals are slender and of medium length.

The relative length of the principal limb bones in this and other species is exhibited in this table, the tarso-metatarsus being taken as a standard of comparison.

Species.	Tarso-metatarsus.	Tibio-tarsus.	Femur.	Humerus.
<i>Taoperdix pessieti</i> .....	100	174	130	143
" <i>kettica</i> .....	100	172	133	121
<i>Palaortyx hoffmanni</i> .....	100	172	124	141

The table given below is intended to facilitate comparison of the actual measurements of various bones of the skeleton in both species of *Taoperdix*. As there exists

<sup>1</sup> "Catalogue of Fossil Birds in the British Museum," p. 139 (London, 1891).

in some instances a discrepancy between the measurements given in the text of Milne-Edwards' work and those indicated in the plates, we have arranged the data obtained from both sources in parallel columns.

TABLE OF COMPARATIVE MEASUREMENTS.

<i>Taoperdix keltica.</i>		<i>Taoperdix pessieti.</i>	
Name of Parts.	Length.	Data from Text.	Data from Figure.
Tarso-metatarsus.....	3.3 cm.	3.5 cm.	3.7 cm.
Tibio-tarsus.....	5.7	6.2	6.3
Femur.....	4.4	4.6	5.0
Humerus.....	3.7	5.0	5.2 and 4.8
Ulna.....	3.6	4.8	4.8
Radius.....	3.3	(Wanting)	—
Metacarpus.....	2.0	2.5	2.5
Coracoid.....	(Incomplete)	3.4	3.4
Scapula.....	"	—	5.0
Mandible.....	3.0	—	3.8
Furcula.....	(Wanting)	—	3.8

No indications of plumage accompany either of the Armissan skeletons, although isolated feathers, and even egg-casts, are not uncommon in the lacustrine deposits of the south of France and in Switzerland. For references to the literature concerning detached feathers, one may consult an article on "Fossil Plumage," in the September number of the *American Naturalist* for 1904.

The following brief notice concerning the nature of the deposits at Aix and Armissan, together with their principal fossil contents, is sufficiently interesting to be reproduced in its entirety. It is taken from the second volume (pp. 551, 552) of Milne-Edwards' important work on the "Fossil Birds of France":

"Les marnes d'Aix (Bouches-du-Rhône), si riches en restes de Reptiles, de Poissons et d'Insectes, en empreintes de feuilles, etc., n'ont pas encore fourni d'ossements d'Oiseaux, mais on y a trouvé des œufs et des plumes admirablement conservés, dont quelques échantillons font partie du musée de Marseille. Ces marnes paraissent s'être déposées à la même époque que le gypse des environs de Paris. En 1836, M. Coquand y a trouvé des restes de Paléothérium, d'après lesquels il établit ce parallélisme qui ne fut pas adopté par Dufrenoy, mais que la plupart des géologues actuels s'accordent à admettre.

"C'est probablement aussi à la même époque que se sont déposés les calcaires lacustres d'Armissan (Aude), dans lesquels M. P. Gervais a fait connaître l'existence d'un Gallinacé, le *Tetrao Pessieti*, que j'ai étudié récemment et rangé dans un genre nouveau intermédiaire entre les Perdrix et les Paons, et que j'ai [re-]nommé *Taoperdix Pessieti*. Ces calcaires, toujours accompagnés de gypse, de rognons de soufre et de silex pyromaque, contiennent des débris de Paléothérium, d'Anoplothérium, des Reptiles, des Poissons d'eau douce, des Insectes, et une riche flore de végétaux qui paraissent avoir péri sous l'influence des causes qui ont agi à Aix."

## SUPPLEMENTARY NOTE.

Since the above description was set in type, the task of working out the second bird skeleton (Cat. No. 2022), referred to above on page 134, has been skilfully performed by Mr. O. A. Peterson, one of the preparators of the Carnegie Museum. In its original condition many of the bones were only partially visible, and portions of them had been injured by the process of sawing or grinding to which the slab had been subjected prior to its acquisition by the Museum. As the result of Mr. Peterson's manipulation all of the preserved portions have been clearly exposed, thus permitting a far more accurate knowledge of details than could otherwise have been obtained. Fortunate as is this circumstance, it renders all the more conspicuous the fact that many characteristic portions, such as the articular extremities of several of the limb-bones, have been irretrievably lost through sawing the slab in two.<sup>1</sup> Notwithstanding the considerable injury done to the remains, they still furnish us with an important and very precious example of Eocene bird remains. The extreme rarity of complete individuals, not more than four or five being known from the Armissan deposits, increases the value of every item of information that is obtainable from any one of them. In the case of the present specimen, the loss of the head deprives us of perhaps the most significant information, concerning which we would have eagerly sought enlightenment. It remains for us to make as searching an inquiry as is possible from a decapitated body.

Fortunately we are able to satisfy ourselves in regard to a number of particulars with approximate accuracy. The conformation of the pelvis, typically gallinaceous, and the form and proportions of the limb-bones, all point to a very close relationship between this skeleton and the type species of *Taoperdix*. Indeed, it appears impossible to doubt that the present specimen and the type of *T. pessieti* are specifically identical, the differences between them falling well within the limits of individual variation. This conclusion is supported, in our judgment, by the following table of measurements, in which it has not been considered necessary to repeat the measurements of *T. keltica*, owing to their relatively greater disproportion. The same characters which enable us to discriminate between that species and the type compel us to distinguish between it and the second Carnegie skeleton now under discussion. A protographic reproduction of the new specimen (No. 2022), of slightly less than the natural size, is given in Plate XV. of this MEMOIR. In Plate XVI. several characteristic bones are shown as they occur in nature, except that in the case

<sup>1</sup> The specimen is evidently a piece of pavement slab, which was only discovered to contain fossil remains after it had been sawn. *Editor.*

of the limb-bones, some of the articular extremities that have been injured are here partially restored.

TABLE OF MEASUREMENTS.

Type Specimen of <i>Taoperdix pessieti</i> .			Carnegie Example of Same Species.	Type Specimen of <i>Taoperdix pessieti</i> .			Carnegie Example of Same Species.
Name of Parts.	Data from Text.	Data from Figure.		Name of Parts.	Data from Text.	Data from Figure.	
			Length.				Length.
Tarso-metatarsus .....	3.5 cm.	3.7 cm.	4.2 cm.	Ulna .....	4.8 cm.	4.8	5.5
Tibio-tarsus .....	6.2	6.3	6.9	Metacarpus .....	2.5	2.5	2.8
Femur .....	4.6	5.0	5.0	Coracoid .....	3.4	3.4	3.7
Humérus .....	5.0	5.2 and 4.8	5.5	Scapula .....	—	5.0	5.0±

## EXPLANATION OF PLATES.

- PLATE XIII. *Taoperdix keltica*, sp. nov. Photograph of the specimen in its natural condition,  $\times \frac{1}{4}$ .
- PLATE XIV. *Taoperdix keltica*, sp. nov. Restoration of skeleton, missing parts represented in outline,  $\times \frac{1}{4}$ .
- PLATE XV. *Taoperdix pessieti* (Gervais). Photograph of the second Carnegie specimen (Cat. No. 2022) in its natural condition,  $\times \frac{1}{4}$ .
- PLATE XVI. *Taoperdix pessieti* (Gervais). Illustrations of the more characteristic bones of the skeleton (Cat. No. 2022), some of the articular extremities slightly restored. All figures of the natural size. 1, *humerus*; 2, *radius and ulna*; 3, *metacarpus*; 4, *phalanges of pes*; 5, *tarso-metatarsus*; 6, *pelvis*; 7, *coracoid*; 8, *femur*; 9, *tibio-tarsus*; 10, *scapula*.



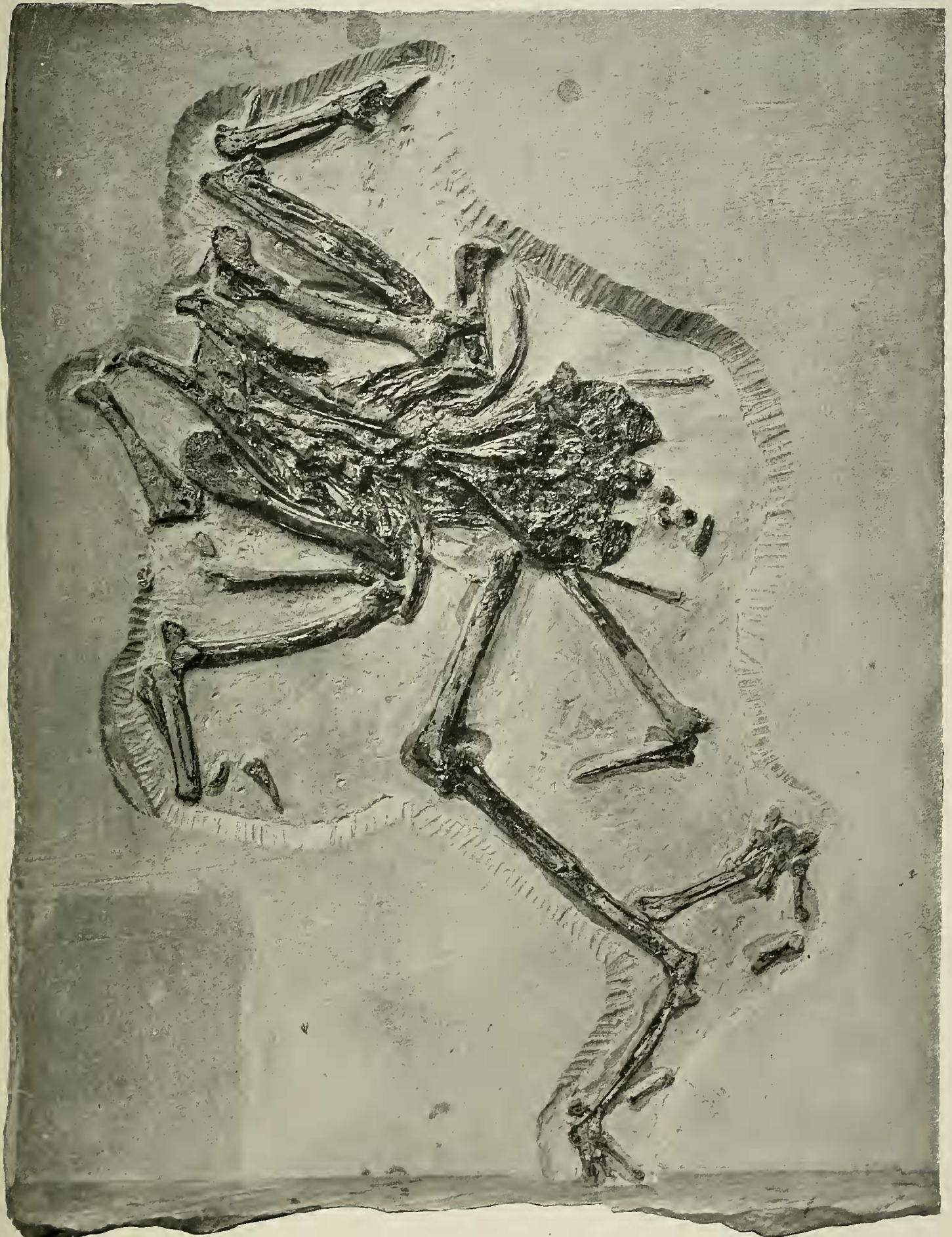


*TAOPERDIX KELTICA* EASTMAN. PHOTOGRAPH OF THE TYPE IN THE CARNEGIE MUSEUM.

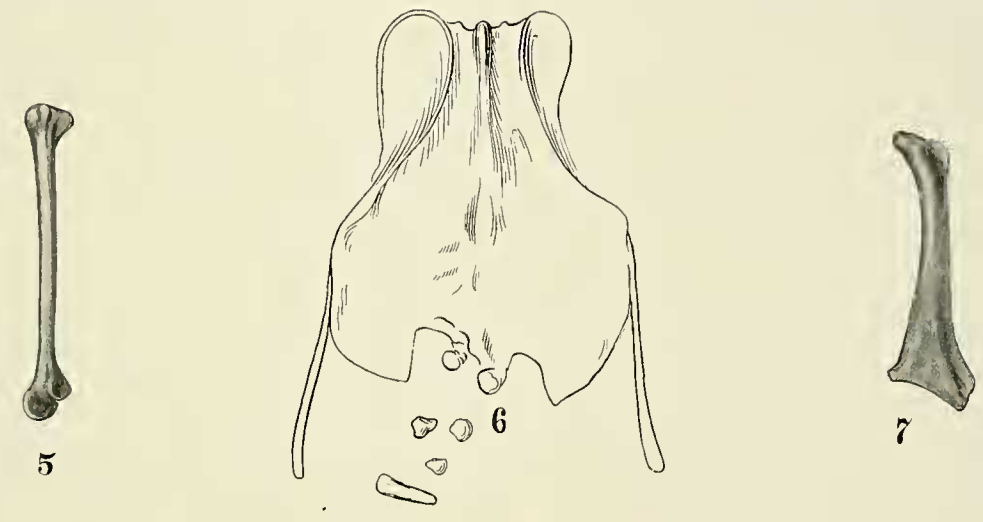
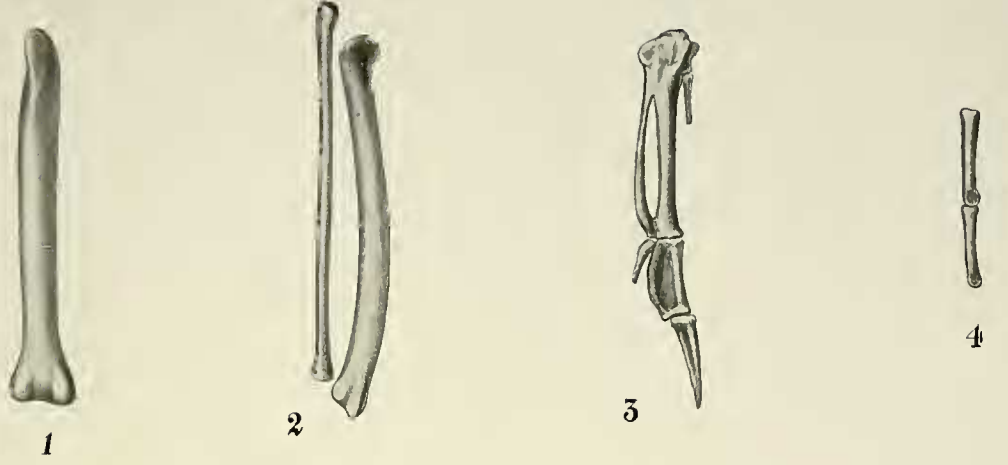


*J. Henry Blake, del.*

TAOPERDIX KELTICA EASTMAN. RESTORATION NATURAL SIZE. THE MISSING PARTS SUPPLIED IN OUTLINE.



*TAOPERDIX PESSIETY* (Gervais). PHOTOGRAPH OF THE ORIGINAL IN THE CARNEGIE MUSEUM.



*TAOPERDIX PESSIETI* (GERVAIS).